

UNITED STATES PATENT APPLICATION

FOR

ONLINE LIVE SEARCH SYSTEMS

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## ONLINE LIVE SEARCH SYSTEMS

BACKGROUND OF THE INVENTIONField of the Invention

5       The present invention is related to the area of Internet browser applications and more particularly related to a method or system for providing online live search over a data network.

Description of the Related Art

10      The Internet is a rapidly growing communication network of interconnected computers and computer networks around the world. Together, these millions of connected computers form a vast repository of multimedia information that is readily accessible by any of the connected computers from anywhere at any time. From a user's perspective, the information is, however, scattering all over the places and disorganized, it is nearly impossible to locate desired information without *a priori* knowledge of the locations. To assist users to find the desired information in a logic manner, many specialized search web sites, well over 370 of them, have been created to provide one or more search engines to assist the users to look for the desired information. Notable examples of the search engines provided on the Internet include

15      20     Yahoo! at [www.yahoo.com](http://www.yahoo.com) and Lycos at [www.lycos.com](http://www.lycos.com). Most of the search engines employ what is called a hunting method, namely a search web site 102 as shown in FIG. 1 sends out a spider 110 (also called a "crawler" or a "bot") over the Internet that goes to every page or representative pages on each of the Web site 116-1, 116-2...

116-n that want to be searchable. Once the spider 110 reads into a Web site, it collects hypertext links on each page to discover and read a site's other pages. As a result, the database 104 maintains a collection of hypertext links that are obtained from the crawling process, submitted by the web sites or through other means .

5        When a query (i.e. a search request) for a particular web site is received from the Internet, a request interface 112 processes the query and activates the search engine 106 that compares the query with the entries in the database 104. The search engine 106 then fetches all relevant links from the database 104. The request interface 112 packs the relevant links and forwards the search result to a user who sent the query. An  
10 alternative to using a search engine is to permit the user to explore a structured directory of topics. Yahoo is the most widely-used directory on the Web. In reality, however, the search results can often run for pages and consequently overwhelm a user. Quite often there are many broken links in the search results because of possible relocation or removal of some of the earlier identified web pages, which consequently frustrates a user.

15        There is therefore a great need for a live online search system that provides interest-specific search results and at the same time ensures that the search result is always updated.

### SUMMARY OF THE INVENTION

An online live search system is disclosed and may be implemented in method or apparatus form that yields one or more of the following advantages and benefits. One of them is a live search system in which every found link is lively searched, hence it is  
5 very unlikely that a found link is broken. Another one is that the found links are closely related to a searcher's subject since the search is conducted among a community having the same or similar interests or areas so that the number of unrelated subjects to a particular search is substantially reduced.

According to one aspect of the present invention, a method includes sending a  
10 query to a first set of users accessible by a first user, the query including information relevant to a request for information. The method also includes receiving a response to the query from a second user, the second user being a member of the first set of users, the response including information responsive to the query, the information accessible in a public portion of a system.

Other objects, benefits and advantages together with the foregoing are attained  
15 in the exercise of the invention in the following description and resulting in the embodiment illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example and not limitation in the accompanying figures.

Figure 1 illustrates a prior art embodiment of a search engine.

5       Figure 2 illustrates an embodiment of a system including a set of computers coupled through a network.

Figure 3A illustrates a representation of an embodiment of two sets of users and interconnections therebetween.

10      Figure 3B illustrates a representation of an embodiment involving users organized for multicasting queries.

Figure 4 illustrates an embodiment of a directory structure of a computer.

Figure 5 illustrates an embodiment of a method of querying for information.

Figure 6 illustrates an alternate embodiment of a method of querying information.

Figure 7 illustrates an embodiment of a system.

15      Figure 8 illustrates an embodiment of a machine-readable medium or media.

Figure 9 illustrates an embodiment of a packet suitable for sending a query.

### DETAILED DESCRIPTION

Embodiments pertaining to the present invention for implementing online live search systems are described. The embodiments may be realized in system, apparatus, or computer readable medium. Each embodiment yields one or more of the following advantages and benefits. One of those is a real live search system built upon computers that are actually online at the time a search is conducted, hence every found responsive to a query is lively searched. As a result, it is very unlikely that a found link is broken. Another one is that the found links are closely related to a searcher's subject since the search is conducted among a community having the same or similar interests or areas so that the number of unrelated subjects to a particular search is substantially reduced.

The detailed description of the invention is presented largely in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Reference herein to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of

the invention do not inherently indicate any particular order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views. Figure 2 shows a system configuration 200. Two computing devices 202 and 204 are coupled to a network 206. For illustration purposes, the computing device 202 is used by a first user who initiates a communication session with a second user using the computing device 204. Hence the first user and the second user are respectively referred to as the sender or caller and the recipient or callee. In one embodiment, the computing devices 202 or 204 is a personal computer that operates under a Windows Operating system provided by Microsoft Corporation. In other embodiments, the computing devices 202 or 204 is a portable device that may include a personal data assistant (PDA) and a palm computing device. In any event, the computing devices 202 and 204 are network enabled, capable of communicating with each other over the data network 206. The data network 206 may include, but is not limited to, the Internet, an Intranet, a wireless network or a network of private or public networks.

Figure 3A illustrates a representation of an embodiment of two sets of users, community 1 and community 2. Each of the communities 1 and 2 may be independent or interconnected through a common member C11. Specifically, the community 1 is formed by C12, C13, ... and C1N and the community 2 is formed by C21, C22, ... and C2N and C11. In the particular case as shown in Figure 3A, C11 is a common or double member of both communities 1 and 2. Unless otherwise specifically stated, members of

a community may interchangeably mean a computing device coupled to the community or a user thereof in communication with the community.

According to one embodiment, a community is formed by member evolvement.

For example, initially, member C11 has a particular interest in computer 3D graphics

5 and inquires a phrase "VRML" from a computer online. If the user of the computer has detailed or various information regarding "VRML" and is willing to provide those to member C11. By virtue of the present invention, the user of the computer has similar interest as member C11 does and may become a member C12 of a "computer 3D graphics" community originated by member C11. As either C11 and C12 have more interactions or queries and receive responses thereto from other users on the network, a larger community is being formed. As more and more interactions going on within the members of the community, the community could be evolved into a network of users or computers that share the same or similar interests.

In one embodiment, users C11, C12, C13, ... and C1N all form a first group of users, while users C11, C21, C22, ... C2N all form a second group of users. In some embodiments, groups are formed as a result of users identifying other users with similar information resources, similar interests, or other common characteristics. These groups may form as a result of users indicating a desire to join such a group, or the groups may form as users discover common characteristics. In one embodiment, this grouping is representative of a first user having knowledge of how to contact a second user and means to contact the second user (such as contacting the second user through use of the Internet for example). It will be appreciated that other methods of forming groups may also exist.

In some cases, a member may join more than one communities. As shown in Figure 3A, member C11 is coupled to members C12, C13, ... and C1N as well as C21, C21, ... C2N and C11, all of which are coupled to a network and hence communicate to each other within its own community. Two communities could communicate through the 5 common member C11.

Figure 3B shows an illustration 350 of members grouped as one or more multicast groups 352a-352n. Each of the members (e.g. 354a-354n in group 352a) is connected to a network such as the Internet. Individual members are free to join or leave a multicast group at any time. There are no restrictions on the physical location or 10 the number of members in a multicast group. A member may be a member of more than one multicast group at any given time and does not have to belong to a group to send/receive messages to members of the group. According to one embodiment, a group membership protocol is employed by routers to learn about the presence of 15 group members on their directly attached to a network. When a member joins a multicast group, it transmits a group membership protocol message for the group(s) that it wishes to communicate with, and sets its IP process and network interface card to receive frames addressed to the multicast group.

In operation, one request member desires responses to its query from a particular multicast group (e.g. group 352a), the query is then multicast to the group. If 20 any member in the group has information pertaining to the query, a response may be forwarded back to the request member. This receiver-initiated join process has excellent scaling properties since, as the multicast group increases in size, it becomes ever more likely that responses to a query will be received.

Figure 4 illustrates an embodiment of a directory structure of a computer. Client 400 includes public portion 410 and private portion 420. Public portion 410 includes directories labeled as 'Music,' 'Video,' 'Photo,' 'Photos,' 'Auction Items,' and 'Others.' Private portion 420 includes directories labeled 'Financial data,' 'Personal data,' 5 'bookmark,' 'files,' and 'others.' In one embodiment, public portion 410 may be accessed by third-party computers in response to requests for information from such third-party computers. Private portion 420 may not be accessed (at least not in an authorized manner) by third-party computers.

In one embodiment, a member willing to share or provide information to others 10 has a computer including resources arranged similar to or reflected in Figure 4 by virtue of the present invention. A user, such as user C11, may seek information about a first subject or seek a response to a query. User C11 sends out the query to each user C11 has contact information for. Each of those users may respond to the query if the each 15 of those users has responsive data, or may forward the request to other users accessible to receive the request. This may be repeated until the query is answered, or until some form of limit is reached, such as a built-in limit to the number of times a query may be forwarded.

Alternatively, in another embodiment, user C11 broadcasts a query to users that user C11 believes are likely to have information, such as users grouped together based 20 on a shared interest in a given subject or a multicast group. For example, users C12, C13 ... C1N may all have an interest in sports, while user C21, C22 ... C2N may have an interest in law. User C11 would have interests in both law and sports. Then, when user C11 has a query related to sports, user C11 may broadcast the query to users

C12, C13 ... C1N, thus providing a potentially efficient use of resources involved in transferring the query.

Figure 5 illustrates an embodiment of a method of querying for information. At block 510, a request or query is sent from a first user to a group of users accessible by

5 the first user. At block 520, information responsive to the query (i.e. a request) is found by one of the users of the group of users. Depending on an exact implementation, the one of the users (i.e. via his/her computer) simply returns a response to the query or forwards the query to another user for further search at 550. At block 530, the

information is supplied to the first user. Alternatively, at block 540, information

10 responsive to the query is not found, and the query is then forwarded at block 550.

This forwarding resembles the initial sending of the query at block 510, in that it is sent from a second user to a group of users accessible by the second user. It may be

preferable to record the users to which the query has been sent each time it is forwarded, to avoid redundant forwarding and looping of queries, or it may be

15 preferable to record the number of times the query is forwarded to avoid excessive forwarding or looping. Similarly, date and time stamps may be employed to prevent consideration of stale queries, and thus eliminate looping or excessive forwarding. The

recording may be implemented directly in the query or indirectly in a message accompanying the query.

20 Once the query is forwarded, the information sought (responsive to the query) may be found (at block 570) and returned to the first user (at block 580). In one embodiment, the information identifying the supplying user is included with the information sought, and at block 590 the supplying user is added to the users

accessible by the first user for purposes of sending further queries. Should the information not be found after forwarding of the query (block 560), then the query may be forwarded again.

Figure 6 illustrates an alternate embodiment of a method of querying information.

- 5 At block 610, a second user receives a request for information from a first user. If the second user has information which is responsive to the request, at block 620 that information is found, and at block 630 the responsive information is returned to the first user.

If information responsive to the request is not directly accessible by the second

- 10 user this is determined at block 640. Following that, at block 650 the request for information is forwarded to other users accessible by the second user. Note that forwarding of the request may be accomplished by forwarding the request to the users deemed likely to have information, all users accessible by the second user, or users accessible by the second user who are not shown to have already received the request  
15 for example.

- If the forwarded request results in a response with information, that information may be received by the second user at block 660. Having received the information from a sender (not the first user), the sender of the information is added to the database or other list of users accessible by the second user at block 670, and the  
20 information responsive to the request is returned to the first user at block 680.

Note that in one embodiment, Figure 6 illustrates a process observed by (or engaged in by) an intermediate user while Figure 5 illustrates the process observed by (or engaged in by) the user originating a query. The user originating a query may be a

sender or caller within the meaning of the description of Figure 2 when originating the query, and a recipient or callee when receiving a response to the query. Similarly, an intermediate user may be a recipient or callee receiving a query and a sender or caller sending a response.

5       Figure 7 illustrates an embodiment of a system. Processor 710 is a processor such as one capable of executing instructions. Control hub 720 is coupled to processor 710 and serves as an interface to processor 710. Memory 730 is coupled to control hub 720 and may store instructions or data for example. Memory 730 may be composed of a single machine-readable medium such as RAM, some form of ROM  
10 (FLASH EEPROM for example), magnetic media, optical media or other storage media of persistent or non-persistent form, or may be composed of multiple media.

Network interface 740 is also coupled to control hub 720 and provides a connection to a network such as an intranet, the internet, or other distributed network. User interface 750 is a user interface coupled to the control hub and may include both input and output devices which may be integrated or discrete, such as a LCD with touch screen capabilities or a combination of monitor and keyboard for example. Note that various components of the system may be integrated, such as integration of the control hub 720 and processor 710 in a single unit, or components of the system may be further broken down into sub-components, such as multiple memory devices composing  
15 memory 730 or a separate input device and output device forming user interface 750. Moreover, not all of the components illustrated need be included in the system and other components may be added within the spirit and scope of the invention.  
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Figure 8 illustrates an embodiment of a machine-readable medium or media or a collection of logic blocks. A machine-readable medium may be composed of one or more media such as RAM, some form of ROM (FLASH EEPROM for example), magnetic media, optical media, carrier waves or other transmissive media, or other storage media of persistent or non-persistent form, or may be composed of multiple media. In one embodiment, a machine-readable medium stores instructions which may be executed on a processor, and thereby cause the processor to perform a function or action. Logic blocks may be either sets of instructions in a machine-readable medium or may be portions of a component embodying logic suitable for causing the component to perform a predetermined function or action upon proper activation of the logic block. It will be appreciated that logic blocks and sets of instructions may overlap with other logic blocks or sets of instructions, and that a combination of logic blocks implemented as a portion of a component and sets of instructions in a medium may be combined to cause performance by a processor or system of a function or action.

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Medium 800 is a machine-readable medium or media including a number of components. Query reception 810 may be a logic block or set of instructions suitable for causing a processor to receive a query sent by another system. Query transmission 820 may be a logic block or set of instructions suitable for causing a processor to transmit a query to another system. User interface 830 may be a set of instructions or logic block suitable for receiving input from and providing output to a user. Group maintenance 840 may be a logic block or set of instructions suitable for maintaining a list of users and corresponding address information for each user or similar database.

Query/File Check 850 may be a logic block or set of instructions suitable for checking a set of files accessible on a system for information responsive to a query.

Figure 9 illustrates an embodiment of a packet structure suitable for transmission of a query. The packet includes three parts. The query originator/sender information 5 may include (in one embodiment) information relating to the user who originated the query, while in an alternate embodiment may include information relating to the user who sent the query (such as a user forwarding a query originated by a different user). The query portion includes the query itself, encoded such that it may be interpreted by a machine and such that information responsive to the query may be found by a machine 10 performing a search of information publicly available. The control information may include (in various embodiments) information relevant to how often the packet has been forwarded, information relevant to when the packet was originated, information relevant to which users have had the packet sent to them, or information relevant to identifying the user originating the query for example. Identification of users and maintenance of groups of users may be accomplished by maintaining a list of email addresses or 15 identifiers of users (names for example) and corresponding IP addresses for example. Note that a packet similar to that of Figure 9 may be suitable for sending a response.

In the foregoing detailed description, the present invention has been described with reference to specific exemplary embodiments thereof. It will, however, be evident 20 that various modifications and changes may be made thereto without departing from the broader spirit and scope of the present invention. In particular, the separate blocks of the various block diagrams represent functional blocks of methods or apparatuses and are not necessarily indicative of physical or logical separations or of an order of

operation inherent in the spirit and scope of the present invention. For example, the various blocks of Figures 7 and 8 may be integrated into components, or may be subdivided into components. Moreover, the blocks of Figures 5 and 6 represent portions of a method which, in some embodiments, may be reordered or may be  
5 organized in parallel rather than in a linear or step-wise fashion. The present specification and figures are accordingly to be regarded as illustrative rather than restrictive.